Pattern of Bacteria, Antibiotic Uses and Sensitivity among Ear, Nose, and Throat Infectious Disease in Otolaryngology Ward in Tertiary Hospital

Yolla Sri Agustina,[1] Imam Megantara,[2] Arif Dermawan[3]

[1]Faculty of Medicine, Universitas Padjadjaran
[2]Departement of Biomedical Sciences, Faculty of Medicine, Universitas Padjadjaran
[3]Departement of Otolaryngology-Head and Neck Surgery, Faculty of Medicine, Universitas Padjadjaran-Dr. Hasan Sadikin General Hospital Bandung

Abstract

Objective: To provide an overview of antibiotic use, bacterial patterns and sensitivity to antibiotics in the otolaryngology ward.

Methods: This was a cross-sectional study, with total sampling method from medical record data of otolaryngology inpatients that use antibiotics for the period of January 1, 2016–June 30, 2016. Exclusion criteria are incomplete patient medical records and chemotherapy or radiotherapy patients. The variables studied were antibiotic use, bacterial pattern and susceptibility.

Results: Among 276 subjects included in the inclusion criteria, the most widely used are single antibiotics (98.9%), generally used for 2–3 days (73.9%), via intravenous lines (92%), and with indications as empirical+prophylaxis (77.5%). Commonly used antibiotics are cefazolin (42.51%), ceftriaxone (29.54%), and cefotaxime (20.76%). The most common bacteria were E. coli (36.36%) and the most sensitive types of antibiotics were meropenem, amikacin, and tigecyclin, while the most resistant antibiotics were ampicillin, ciprofloxacin, and ceftriaxone.

Conclusions: The majority of antibiotics used in the otolaryngology treatment room are cefazolin as prophylaxis. *E. coli* were the most found culture results and the most sensitive types of antibiotics, namely meropenem, amikacin, and tigecyclin, while the most resistant antibiotics were ampicillin, ciprofloxacin, and ceftriaxone.

Received:
January 30, 2019

Revised:
March 17, 2019

Accepted:
March 22, 2019

Keywords: Antibiotics, antibiotic sensitivity, bacterial pattern, ears, nose, throat

pISSN: 2302-1381; eISSN: 2338-4506; http://doi.org/10.15850/ijihs.v7n1.1545
IJIHS. 2019;7(1):39–47

Introduction

Ear, nose, and throat (ENT) disease have morbidity that can have a major effect on the life of the sufferer.[1] For example, in patients with hearing loss can experience difficulties in communication.[2] Choking or swallowing foreign objects if not handled properly and quickly can cause death due to asphyxia.[3] A study that conducted at Department of ENT, Dr. R. D. Kandou Hospital, Manado, Indonesia about inpatient patterns in 2010-2012 showed that from 429 cases, the incidences of throat disease was 239 cases (55.97%), nose disease 163 cases (38.17%) and ear disease 25 cases (5.85%). From this study it can be concluded that the 10 most common ENT diseases, namely (1) acute pharyngitis, (2) epistaxis, (3) tonsillitis, (4) nasal polyps, (5) nasopharyngeal cancer, (6) benign neoplasm of connective or soft tissue of head, face, and neck, (7) laryngeal tumors, (8) tonsilopharyngitis, (9) laryngitis, and (10) sinusitis.[4] Five of the 10 diseases are infectious diseases. The ears, nose and throat are anatomically close and histologically similar so the infection in these structures is usually caused by the same bacteria. Several studies have shown that 5 main causes of ENT diseases are *Staphylococcus aureus*,

Correspondence:
Yolla Sri Agustina, Faculty of Medicine, Universitas Padjadjaran
Jl. Raya Bandung-Sumedang KM 21 Jatinangor, Indonesia
e-mail: yollasa08@gmail.com

Streptococcus sp., *Pseudomonas aeruginosa*, *Proteus sp*., and *Escherichia coli*.[5,6,7]

Antibiotics are one of the drugs that are often used in ENT wards, as a causative therapy in infectious diseases and prophylaxis in surgical procedures. In its use, administration of antibiotics must be in accordance with the diagnosis of the disease and the cause of the microorganism. Various studies state that around 40–62% of antibiotics are used inappropriately, for example it is used for diseases that do not actually require antibiotics. A previous study on the quality of antibiotic use in various parts of the hospital found 30% to 80% not based on indications. This can cause antibiotic resistance. Antibiotic resistance can have an impact on morbidity and mortality, it also has a negative economic and social impact.[8]

Antibiotic resistance has now become a common problem in Indonesia such as in Bandung, Indonesia. Based on a study on bacterial pattern and their sensitivity in patients with the ventilator-associated pneumonia (VAP) in the Intensive Care Unit (ICU) of Dr. Hasan Sadikin General Hospital, Bandung, the most common bacteria that cause VAP are Acinetobacter baumannii (41.9%), Pseudomonas aeruginosa (18.6%), and Klebsiella pneumoniae (16.9%). From the results of the sensitivity test, the sensitivity of the bacteria to some antibiotics decreased and some showed signs of resistance.[9]

The purpose of this study was to provide an overview of antibiotic use, bacterial patterns and their sensitivity to antibiotics in ENT wards. The results of this study are expected to be a reference for the use of antibiotics for the Antimicrobial Prevention Program (PPRA) at Dr. Hasan Sadikin General Hospital, Bandung.

Methods

This was a descriptive study and conducted from August to November 2018. The study used a cross-sectional design using secondary data from the Inpatient Medical Record Installation at the Dr. Hasan Sadikin General Hospital, Bandung in the period January–June 2016. Inclusion criteria in this study were all medical record data of patients using antibiotics in ENT wards at Dr. Hasan Sadikin General Hospital, Bandung. Exclusion criteria were incomplete or missing medical records and patients with the primary diagnosis of chemotherapy or radiotherapy.

Data was taken from the patient's medical record by the total sampling method, and was processed using computerized software. Data collection were carried out after obtaining ethical approval number 429/UN6.KEP/EC/2018 issued by the Health Research Ethics Committee of the Faculty of Medicine, universitas Padjadjaran and obtaining a research permit issued by Dr. Hasan Sadikin General Hospital, Bandung (No. LB.02.01/X.2.2.1/14556/2018). Selected data would be analyzed and presented in table form to illustrate patterns of antibiotic use, bacterial patterns and their sensitivity to antibiotics.

Results

Based on the list of names given by medical record installations, the number of ENT inpatients in the study period was 493 people, but there were 139 data that were not stored in the medical record installation, leaving the remaining 370 data.

Among 370 data, 7 data were excluded because patients did not use antibiotics, and 71 data were excluded because patients had a primary diagnosis of chemotherapy and radiotherapy, leaving 276 data that met the inclusion criteria and were used in this study.

The characteristics of ENT inpatients could be seen (Table 1). It revealed that the most frequently found age groups were adults with 160 patients (58%).

Table 1 Characteristics of ENT Inpatients (n=276)

Characteristic	n	%
Age		
<1 years old (infant)	0	0
1–<10 years old (child)	22	8
10–<20 years old (teenager)	53	19.2
20–60 years old (adult)	160	58
>60 years old (elderly)	41	14.9
Gender		
Male	161	58.3
Female	115	41.7
Length of stay		
1-3 days	90	32.6
4-6 days	120	43.4
≥ 7 days	66	24

Table 2 Diagnosis of ENT Inpatients (n=276)

ICD	Diagnosis	n	%
C01	Malignant Neoplasm of Base of Tongue	2	0.72
C02	Malignant Neoplasm of Other & Unspecified Parts of Tongue	3	1.09
C05	Malignant Neoplasm of Palate	1	0.36
C07	Malignant Neoplasm of Parotid Gland	1	0.36
C09	Malignant Neoplasm of Tonsil	3	1.09
C11	Malignant Neoplasm of Nasopharynx	7	2.54
C13	Malignant Neoplasm of Hypopharynx	1	0.36
C30	Malignant Neoplasm of Nasal Cavity & Middle Ear	10	3.62
C31	Malignant Neoplasm of Accessory Sinuses	18	6.52
C32	Malignant Neoplasm of Larynx	14	5.07
C44	Other Unspecified Malignant Neoplasm of Skin	4	1.45
C73	Malignant Neoplasm of Thyroid Gland	3	1.09
C85	Other Specified & Unspecified Types of Non-Hodgkin Lymphoma	1	0.36
D04	Carcinoma In Situ of Skin	1	0.36
D10	Benign Neoplasm of Mouth and Pharynx	8	2.9
D11	Benign Neoplasm of Major Salivary Gland	4	1.45
D14	Benign Neoplasm of Middle Ear & Respiratory System	7	2.54
D18	Hemangioma & Lymphangioma	3	1.09
D21	Other Benign Neoplasm of Connective & Other Soft Tissue	1	0.36
D34	Benign Neoplasm of Thyroid Gland	4	1.45
D36	Benign Neoplasm of Other & Unspecified Sites	1	0.36
D37	Neoplasm of Uncertain Behaviour of Oral and Digestive Organs	2	0.72
E04	Other Non-Toxic Goiter	1	0.36
G47	Sleep Disorders	9	3.26
H61	Other Disorders of External Ear	1	0.36
H66	Suppurative and Unspecified Otitis Media	6	2.17
H70	Mastoiditis & Related Conditions	37	13.41
H71	Cholesteatoma of Middle Ear	2	0.72
H72	Perforation of Tympanic Membrane	18	6.52
H90	Conductive and Sensorineural Hearing Loss	2	0.72
J04	Acute Laryngitis and Tracheitis	1	0.36
J05	Acute Obstructive Laryngitis (Croup) & Epiglottitis	1	0.36
J30	Vasomotor and Allergic Rhinitis	2	0.72
J31	Chronic Rhinitis, Nasopharyngitis & Pharyngitis	3	1.09
J32	Chronic Sinusitis	15	5.43
J33	Nasal Polyp	3	1.09
J34	Other & Unspecified Disorders of Nose and Nasal Sinuses	4	1.45
J35	Chronic Disease of Tonsils and Adenoids	6	2.17
J36	Peritonsillar Abscess	2	0.72
J39	Other diseases of Upper Respiratory Tract	3	1.09
J44	Other Chronic Obstructive Pulmonary Diseases	4	1.45
J80	Acute Respiratory Distress Syndrome	2	0.72
J96	Respiratory Failure	2	0.72
J98	Other Respiratory Disorders	7	2.54
K07	Dentofacial Anomalies	2	0.72
K09	Cysts of Oral Region	1	0.36

K12	Stomatitis and Related Lesions	5	1.81
L02	Cutaneous Abscess, Furuncle & Carbuncle	1	0.36
L92	Granulomatous Disorders of Skin & Subcutaneous Tissue	1	0.36
M79	Other Soft Tissue Disorders	1	0.36
M95	Other Acquired Deformities of The Musculoskeletal System & Connective Tissue	3	1.09
Q17	Other Congenital Malformation of Ear	2	0.72
Q18	Other Congenital Malformations of Face & Neck	1	0.36
S01	Open Wound of Head	1	0.36
S02	Fracture of Skull and Facial Bones	8	2.9
S08	Traumatic Amputation of Parts of Head	1	0.36
S11	Open Wound of Neck	1	0.36
T16	Foreign Body in Ear	1	0.36
T17	Foreign Body in Respiratory Tract	3	1.09
T18	Foreign Body in Alimentary Tract	13	4.71
T81	Complications of Procedures	1	0.36
	Total	276	100

The majority of sex distribution is male with 161 patients (58.3%). The length of stay was mainly for 4–6 days which was 120 data (43.4%). Based on results on the study, 276 patients were divided into 61 types of diseases (Table 2).

Mastoiditis is the disease with the highest number of patients, 37 patients (13.41%), followed by malignant neoplasm of paranasal sinus 18 patients (6.52%), tympanic membrane perforation 18 patients (6.52%), chronic sinusitis 15 patients (5.43%), and malignant neoplasm of larynx 14 patients (5.07%).

The results showed that 273 patients (98.9%) used a single antibiotic (Table 3). Antibiotic changes were only carried out in 8 patients (2.9%). The antibiotics generally used for 2–3 days with 204 data (73.9%).

Table 3 Characteristic of Antibiotic Use (n=276)

Characteristic	n	%
Drug prescribed		
Single antibiotic	273	98.9
Combination of 2 antibiotic	3	1.1
Combination of >2 antibiotic	0	0
Antibiotic change		
Yes	8	2.9
No	268	97.1
Duration		
1 day	15	5.4
2-3 days	204	73.9
4-7 days	36	13
> 7 days	21	7.6
Indication		
Definitive	7	2.5
Empirical	42	15.5
Prophylaxis	11	4
Prophylaxis + Definitive	2	0.7
Prophylaxis + Empiric	214	77.5
Route		
Intravenous	254	92
Peroral	6	2.2
Intravenous + Peroral	16	5.8

Antibiotics were widely used with empirical + prophylactic indications as shown in 214 patients (77.5%). Majority of the antibiotics was administered via intravenous lines with 254 data (92%)

Among 276 patients given antibiotics, there were 13 types of single antibiotics and combinations given (Table 4). Among13 types of antibiotics, there were 10 single antibiotics (99.4%) and 3 combinations of 2 antibiotics (0.06%). The most widely administered type of single antibiotic was cefazolin as many as 213 data (42.51%), ceftriaxone 148 data (29.54%), and cefotaxime 104 data (20.76%). The combination antibiotic used was a combination of ceftriaxone with cefotaxime, cotrimoxazole, and levofloxacin with the use of each 1 datum (0.2%).

The use of antibiotics can be described more specifically based on the type of therapy which includes prophylaxis, empirical, and

Table 4 Distribution of Antibiotic Use

Antibiotics	Definitive		Empiric		Prophylaxis		Total	
	n	%	n	%	n	%	n	%
Single antibiotic								
Amoxicillin	1	10	1	0.38	1	0.44	3	0.6
Cefadroxil	0	0	0	0	1	0.44	1	0.2
Cefazolin	1	10	2	0.76	210	92.51	213	42.51
Cefixime	0	0	7	2.65	1	0.44	8	1.6
Cefotaxime	0	0	94	35.61	10	4.41	104	20.76
Ceftriaxone	5	50	139	52.65	4	1.76	148	29.54
Ciprofloxacin	0	0	12	4.55	0	0	12	2.4
Co Amoxiclav	0	0	2	0.76	0	0	2	0.4
Levofloxacin	1	10	4	1.52	0	0	5	1
Ofloxacin	0	0	2	0.76	0	0	2	0.4
Combination of antibiotic								
Ceftriaxone + Cefotaxime	0	0	1	0.38	0	0	1	0.2
Ceftriaxone + Cotrimoxazole	1	10	0	0	0	0	1	0.2
Ceftriaxone + Levofloxacin	1	10	0	0	0	0	1	0.2
Total	10	100	264	100	227	100	501	100

definitive therapy. The most commonly used antibiotic as prophylaxis was cefazolin with 210 data (92.51%), as empirical therapy was ceftriaxone with 139 data (52.65%), and as definitive therapy was ceftriaxone with 5 data (50%).

Both culture and bacterial sensitivity tests were rarely carried out, only 13 patients (4.7%) were tested for culture and 7 patients (2.5%) were tested for bacterial sensitivity. Of the 13 patients, 21 samples were tested, 10 of which had no bacterial growth. There were 6 types of bacteria found, *E. coli* with 4 data (36.36%), *S. epidermidis* 1 data (9.09%), *K. pneumoniae* 1 data (9.09%), *Pseudomonas aeruginosa* 1 data (9.09%), *A. baumannii* 2 data (18.18%), and *Aeromonas salmonicida* 2 data (18.18%).

The results of the bacterial sensitivity test can be seen (Table 6). *E. coli* is only sensitive to 7 of the 17 types of antibiotics tested. *S. epidermidis* is sensitive to 15 of the 19 types of antibiotics tested except chloramphenicol, ciprofloxacin, cotrimoxazole, and levofloxacin. *K. pneumoniae* is still sensitive to 13 of the 15 types of antibiotics tested. *P. aeruginosa* is still sensitive to amikacin, ceftazidime, ciprofloxacin, gentamicin, meropenem, and piperacillin/tazobactam. *A. baumannii* is only sensitive to amikacin, meropenem, piperacillin/tazobactam, tigecyclin, and trimethoprim-sulfamethoxazole. *E. coli*, *P. aeruginosa*, and *A. baumannii* isolates were resistant to cefazolin which was the most common antibiotic used in this study. Resistance was found to be higher against ampicillin, ciprofloxacin, and ceftriaxone and was rarely found in meropenem, amikacin, and tigecyclin.

Table 5 Overview of Culture Tests and Bacterial Sensitivity Tests (n=276)

Test	n	%
Culture test		
Tested	13	4.7
Not tested	263	95.3
Bacterial sensitivity test		
Tested	7	2.5
Not tested	269	97.5

Table 6 Culture Test and Bacterial Sensitivity Tests Results (n=9)

Organism (Number of Samples)	Antibiotics	Susceptible		Intermediate		Resistant	
		n	%	n	%	n	%
E. coli (4)	Amikacin	4	100	0	0	0	0
	Ampicillin	0	0	0	0	2	50
	Ampicillin/Sulbactam	0	0	0	0	4	100
	Aztreonam	0	0	0	0	4	100
	Cefazolin	0	0	0	0	4	100
	Cefepime	0	0	0	0	4	100
	Ceftazidime	0	0	0	0	4	100
	Ceftriaxone	0	0	0	0	4	100
	Ciprofloxacin	0	0	0	0	4	100
	Cotrimoxazol	1	25	0	0	1	25
	Ertapenem	2	50	0	0	0	0
	Gentamicin	0	0	0	0	4	100
	Meropenem	3	75	0	0	0	0
	Nitrofurantoin	1	25	1	25	0	0
	Piperacillin/Tazobactam	0	0	0	0	4	100
	Tigecyclin	4	100	0	0	0	0
	TMP-SMX*	1	25	0	0	1	25
S. epidermidis (1)	Amoxicillin/Clavulanate	1	100	0	0	0	0
	Ampicillin/Sulbactam	1	100	0	0	0	0
	Cefadroxil	1	100	0	0	0	0
	Cefazolin	1	100	0	0	0	0
	Cefepime	1	100	0	0	0	0
	Cefixime	1	100	0	0	0	0
	Cefoperazon	1	100	0	0	0	0
	Cefotaxime	1	100	0	0	0	0
	Cefoxitin	1	100	0	0	0	0
	Ceftazidime	1	100	0	0	0	0
	Ceftriaxone	1	100	0	0	0	0
	Cefuroxime	1	100	0	0	0	0
	Chloramphenicol	0	0	0	0	1	100
	Ciprofloxacin	0	0	0	0	1	100
	Cotrimoxazol	0	0	0	0	1	100
	Erythromycin	1	100	0	0	0	0
	Gentamicin	1	100	0	0	0	0
	Levofloxacin	0	0	0	0	1	100
	Meropenem	1	100	0	0	0	0
K. pneumonia (1)	Amikacin	1	100	0	0	0	0

	Ampicillin	0	0	0	0	1	100
	Ampicillin/Sulbactam	1	100	0	0	0	0
	Aztreonam	1	100	0	0	0	0
	Cefazolin	1	100	0	0	0	0
	Cefepime	1	100	0	0	0	0
	Ceftazidime	1	100	0	0	0	0
	Ceftriaxone	1	100	0	0	0	0
	Ciprofloxacin	1	100	0	0	0	0
	Ertapenem	1	100	0	0	0	0
	Gentamicin	1	100	0	0	0	0
	Meropenem	1	100	0	0	0	0
	Nitrofurantoin	0	0	1	100	0	0
	Tigecyclin	1	100	0	0	0	0
	TMP-SMX*	1	100	0	0	0	0
P. aeruginosa (1)	Amikacin	1	100	0	0	0	0
	Ampicillin	0	0	0	0	1	100
	Ampicillin/Sulbactam	0	0	0	0	1	100
	Aztreonam	0	0	1	100	0	0
	Cefazolin	0	0	0	0	1	100
	Cefepime	0	0	1	100	0	0
	Ceftazidime	1	100	0	0	0	0
	Ceftriaxone	0	0	0	0	1	100
	Ciprofloxacin	1	100	0	0	0	0
	Gentamicin	1	100	0	0	0	0
	Meropenem	1	100	0	0	0	0
	Nitrofurantoin	0	0	0	0	1	100
	Piperacillin/Tazobactam	1	100	0	0	0	0
	Tigecyclin	0	0	0	0	1	100
	TMP-SMX*	0	0	0	0	1	100
A.	Amikacin	2	100	0	0	0	0
baumannii (2)	Ampicillin	0	0	0	0	2	100
	Ampicillin/Sulbactam	0	0	0	0	2	100
	Aztreonam	0	0	0	0	2	100
	Cefazolin	0	0	0	0	2	100
	Cefepime	0	0	0	0	2	100
	Ceftazidime	0	0	0	0	2	100
	Ciprofloxacin	0	0	0	0	2	100
	Gentamicin	0	0	0	0	2	100
	Meropenem	1	50	0	0	1	50
	Nitrofurantoin	0	0	0	0	2	100
	Piperacillin/Tazobactam	1	50	0	0	1	50

Discussion

The results of this study show that 273 patients (98.9%) were given a single antibiotic. Antibiotic changes were only carried out in 8 patients (2.9%). The majority of the duration of antibiotic use is 2–3 days with 204 data (73.9%). The indications of giving antibiotics mostly are for prophylactic and empirical purpose with 214 patients (77.5%). The most widely used route is 254 intravenous data (92%). There are 13 types of single antibiotics and combinations given, 10 single antibiotics (99.4%) and 3 combinations of 2 antibiotics (0.06%). The most common type used as single antibiotic was cefazolin with 213 data (42.51%). The combination antibiotic used is a combination of ceftriaxone with cefotaxime, cotrimoxazole, and levofloxacin with the use of each 1 data (0.2%). A similar study in India stated that 1797 patients (69.11%) were given a single antibiotic, 398 patients (49.56%) were given a combination of 2 antibiotics. The most frequently used routes are as many as 2699 data (74.99%). The most commonly prescribed antibiotics are beta-lactam groups of 2724 data (75.68%).[10] The results of this study are in line with the study because single antibiotics were given more to patients and the antibiotics prescribed by the majority were beta-lactam groups. The possibility of the beta-lactam group is used because of its broad spectrum making it effective for curing infectious diseases.[11] In both studies there were differences in the route of administration of the most commonly used antibiotics. This might happen because in the study the number of outpatients was more than inpatients, so that the oral route was more preferred.

In this study, the most commonly used antibiotic as prophylaxis was cefazolin with 210 data (92.51%), as empirical therapy was ceftriaxone with 139 data (52.65%), and as definitive therapy was ceftriaxone with 5 data (50%). Other similar studies in the United States stated that antibiotics used as prophylaxis were 2230 data of ampicillin/sulbactam (25.2%), clindamycin 1431 data (14.2%), cefazolin + metronidazole 1220 data (13.8%), cefazolin 835 data (9.5%), and others 3210 data (35.3%).12 There are differences in prophylactic antibiotics used in both studies, but not significant because the majority use beta-lactam groups. Based on the Regulation of the Ministery of Health of the Republic of Indonesia Number 2406/MENKES/PER/XII/2011 About General Guidelines for the Use of Antibiotics, I and II generation cephalosporins are recommended for use as surgical prophylaxis.[8] According to the American Academy of Otolaryngology-Head and Neck Surgery, definitive therapy recommendations are adjusted to disease-causing organisms, but the most recommended are penicillin groups. Recommendations for empirical therapy may vary depends on the disease, but the majority recommended are beta-lactam groups (penicillins and cephalosporins).[13] This indicates that the results of this study are in line with therapeutic recommendations because the majority of those used are ceftriaxone which is a beta-lactam group.

In this study the culture and sensitivity tests were only carried out in a few patients, namely 13 patients (4.7%) who were tested for culture and 7 patients (2.5%) who were tested for bacterial sensitivity. There are 6 types of bacteria found, i.e., *E. coli*, *S. epidermidis*, *K. pneumoniae*, *P. aeruginosa*, *A.baumannii*, and *Aeromonas salmonicida*. Similar study conducted in Germany states that there are 6 types of bacteria found, i.e. *S. pneumoniae*, *Moraxella Catarrhalis*, *Haemophillus influenzae*, *S. pyogenes*, *S. aureus*, and *P. aeruginosa*. There is a type of bacteria found in both studies which is *P. aeruginosa*. The results of this study indicate that *P. aeruginosa* is still sensitive to amikacin, ceftazidime, ciprofloxacin, gentamicin, meropenem, and piperacillin/tazobactam. The results of this study were lower than the results of the study in Germany because in the study *P. aeruginosa* was still sensitive to all the antibiotics tested. This can occur because research in Germany uses more samples so the results are more diverse.[14]

This study had several limitations such as many medical record data that were not stored in the MCI and the incomplete information contained in the medical record regarding the use of antibiotics, especially for indications of its use. Resistance had also begun to emerge so that the use of antibiotics must be re-evaluated to prevent such resistance from increasing. Suggestions for overcoming the limitations of this study are the writing of a complete medical record and conducting further research related to the pattern of antibiotic use, bacterial patterns and its sensitivity in the ENT department so that the results of the study can be discussed further.

In summary, there are several types of antibiotic used in ENT Department and also pattern of bacteria and its sensitivity. Bacterial resistance can be prevented by giving proper antibiotics to the patients.

References

1. Farooq M, Ghani S, Hussain S. Prevalence of ear, nose & throat diseases and adequacy of ent training among general physicians. Int J Pathol. 2016;14(3):113–5.
2. Lemke U, Scherpiet S. Oral communication in individuals with hearing impairment—considerations regarding attentional, cognitive and social resources. Front Psychol [serial on the internet]. 2015 Jul [cited 2018 Aug 20];6(2015):[about 7p.]. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4505078/.
3. Kim IA, Shapiro N, Bhattacharyya N. The national cost burden of bronchial foreign body aspiration in children. Laryngoscope. 2015;125(5):1221–4.
4. Kandouw CE, Palandeng OI, Mengko S. Pola penderita rawat inap T.H.T.K.L di BLU RSUP Prof. Dr. R. D. Kandou Manado periode Januari 2010–Desember 2012. J e-Clinic. 2015;3(3):869–76.
5. Saputra A, Qamariah N, Muthmainah N. Pola kepekaan isolat bakteri aerob pada rhinosinusitis kronis tinjauan terhadap penderita dewasa di Poliklinik T.H.T RSUD Ulin Banjarmasin dan RSUD Moch. Ansari Saleh Banjarmasin periode Juni–Agustus tahun 2016. Berkala Kedokteran. 2017;13(1):105–12.
6. Waworuntu OA, Palandeng OEI, Bernadus JBB. Pola kuman penyebab otitis eksterna serta kepekaannya terhadap antibiotik di Poliklinik T.H.T.K.L RSUP Prof. Dr. R. D. Kandou Manado periode Mei–Oktober 2016. Kedokt Klin. 2017;1(3):56–64.
7. Sembiring RO, Porotu'o J, Waworuntu O. Identifikasi bakteri dan uji kepekaan antibiotik pada penderita tonsilitis di Poliklinik T.H.T.K.L BLU RSUP Prof. Dr. R. D. Kandou Manado. e-Biomedik. 2013;1(2):1053–7.
8. Kementrian Kesehatan Republik Indonesia. Peraturan Menteri Kesehatan Republik Indonesia Nomor 2406/MENKES/PER/XII/2011 tentang pedoman umum penggunaan antibiotik. Jakarta: Kementrian Kesehatan Republik Indonesia Indonesia; 2011.
9. Jundi AF, Kss ND, Mulyana Y. Pattern of bacteria and its susceptibility of ventilator-associated pneumonia patients in ICU at Dr. Hasan Sadikin General Hospital, Bandung. Althea Med J. 2016;2(3):195–9.
10. Khan FA, Nizamuddin S, Salman MT. Patterns of prescription of antimicrobial agents in the department of otorhinolaryngology in a tertiary care teaching hospital. African J Pharm Pharmacol. 2011;5(14):1732–8.
11. Katzung BG, Masters SB, Trevor AJ. Basic & Clinical Pharmacology. 12th ed. McGraw-Hill Medical; 2012. 789-838 p.
12. Langerman A, Thisted R, Hohmann S, Howell M. Antibiotic and duration of perioperative prophylaxis predicts surgical site infection in head and neck surgery. Otolaryngol Head Neck Surg. 2016;154(6):1054–63.
13. Fairbanks DNF. Pocket guide to antimicrobial therapy in otolaryngology. Washington D.C.: American Academy of Otolaryngology, Head & Neck Surgery Foundation, Inc.; 2007.
14. Olzowy B, Kresken M, Havel M, Hafner D, Körber-Irrgang B. Antimicrobial susceptibility of bacterial isolates from patients presenting with ear, nose and throat (ENT) infections in the German community healthcare setting. Eur J Clin Microbiol Infect Dis. 2017;36(9):1685–90.